Information about Figure 1 Examples of Adult Dioxin Exposures from the Dioxins and Furans: Reducing Exposures at Home Brochure

Figure 1 compares typical dioxin and furan exposures in Michigan to the increased exposures that may result from the higher levels of dioxins and furans that are present in soils, fish, and wild game in and along the Tittabawassee River. "Typical" levels of exposure were determined using background levels of soil dioxin levels (levels typically found in other rural and urban areas of Michigan) levels of dioxin typically found in foods eaten in the United States. This "Marketbasket" information is from the U. S. Food and Drug Administration. The Tittabawassee River data used in the comparison is from soil, fish and wild game that have been collected from the Tittabawassee River area of concern. The exposure scenarios for each person were chosen to demonstrate exposure levels of a typical Michigan resident (Person 1). Person 1, the typical Michigan resident, is compared to someone who lives on contaminated soils in the Tittabawassee River floodplain who reduces exposures by following the state agency recommendations and advisories (Person 2). Person 1 is also compared to someone who lives on contaminated soils in the floodplain who do not reduce exposures and who does not follow the fish and wild game advisories (Person 3); and to a resident who lives on contaminated soils on the floodplain and who eats a higher level of fish from the Tittabawassee River (Person 4).

This information is intended to inform residents and concerned individuals of relative levels of dioxin exposure from different sources to allow them to make informed decisions to control their exposures.

Please note that dioxins and furans are usually found as mixtures, therefore the total toxicity of the 17 most toxic dioxin and furan compounds is usually expressed as a single value, the toxic equivalent concentration, or TEQ. Dioxin concentrations from exposure sources used in developing these graphs are frequently expressed in parts per trillion (ppt) TEQ.

View Figure 1 from Brochure

View Description of Each Person

In July 2005, the U.S. Food and Drug Administration (FDA) updated the information used for the U.S. Marketbasket intakes in Figure 1 from Dioxin and Furans: Reducing Exposures at Home Brochure. As a result, MDEQ is providing an updated version of Examples of Adult Dioxin Exposures and the supporting information for this graph.

View Examples of Adult Dioxin Exposures (FDA 2005, Update)

View Table of % Exposures

View Daily Adult Exposure Examples with ATSDR Health Benchmark

View Table of Daily Intakes

View Monthly Adult Exposure Examples with WHO Health Benchmark

View Table of Monthly Intakes

View Person 1 Daily Intakes

View Person 2 Daily Intakes

View Person 3 Daily Intakes

View Person 4 Daily Intakes

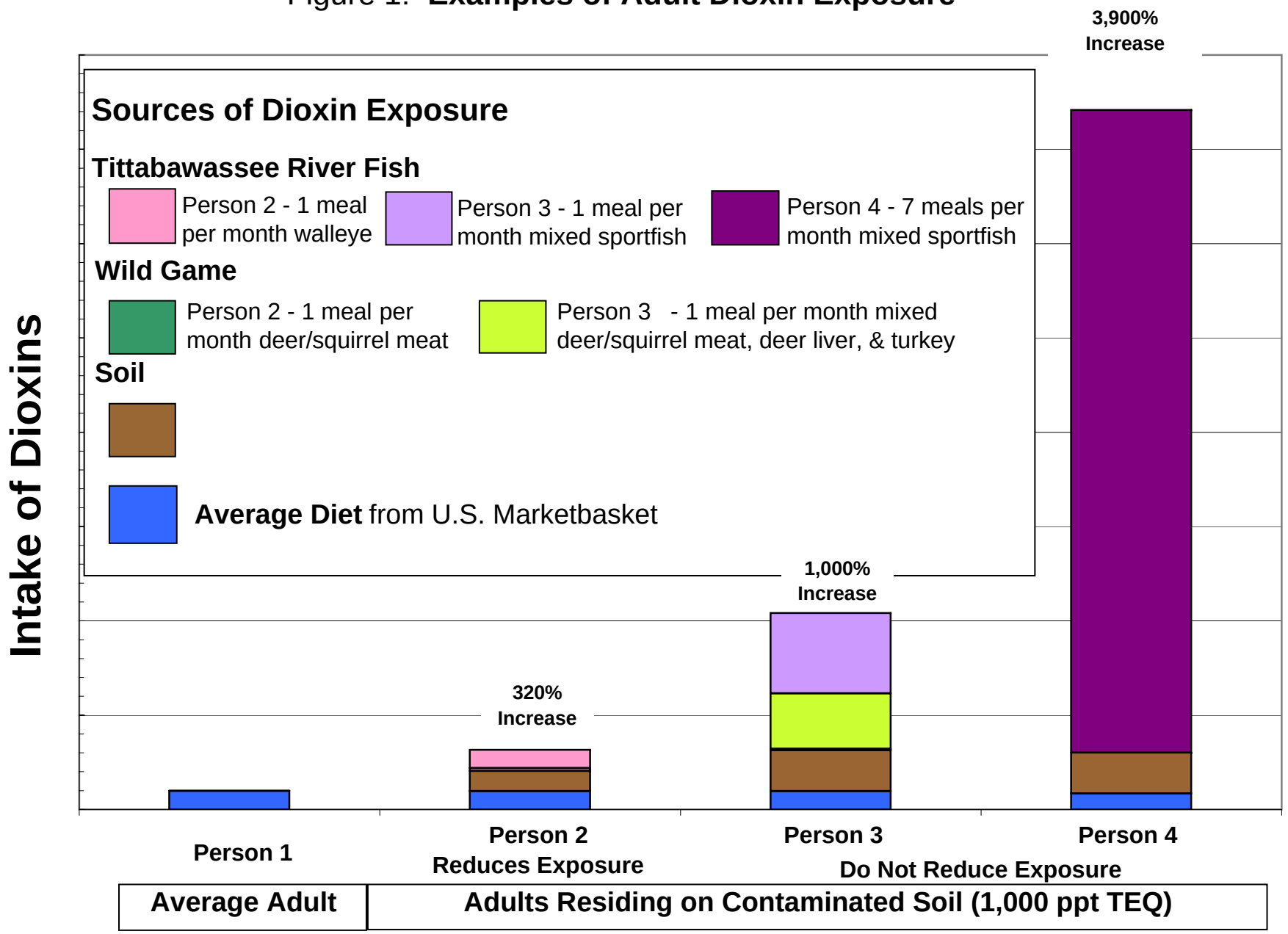
View Local Sources Table

View FDA, 2005 update Table

View FDA, 2004 Table

View References

Figure 1: **Examples of Adult Dioxin Exposure**



Adult Exposure Level Description

How much dioxin gets into your body depends, in part, on what you eat and how much contact you have with contaminated soil and dust. Figure 1 compares the estimated dioxin exposure of an average adult living in the United States to three people who reside on and consume food from contaminated property in the Tittabawassee River floodplain or in Midland.

These three people reside in the contaminated area with assumed soil levels of 1,000 ppt TEQ. This level is typical of the level of contamination seen in repeatedly flooded areas of this floodplain. Two of these people eat about an 8 ounce (oz.) meal of fish from the Tittabawassee River and an 8-oz. meal of wild game from this floodplain per month. The graph also shows a person (Person 4) who may eat a higher than average amount of Tittabawassee River fish (two meals per week).

Person 1 is an average adult who does not reside in an area of elevated dioxin levels and whose dioxin exposure comes from eating the very small amounts of dioxin that are present in the food supply, what you would buy at the grocery store. Most people in the United States have dioxin exposure mainly from their food.

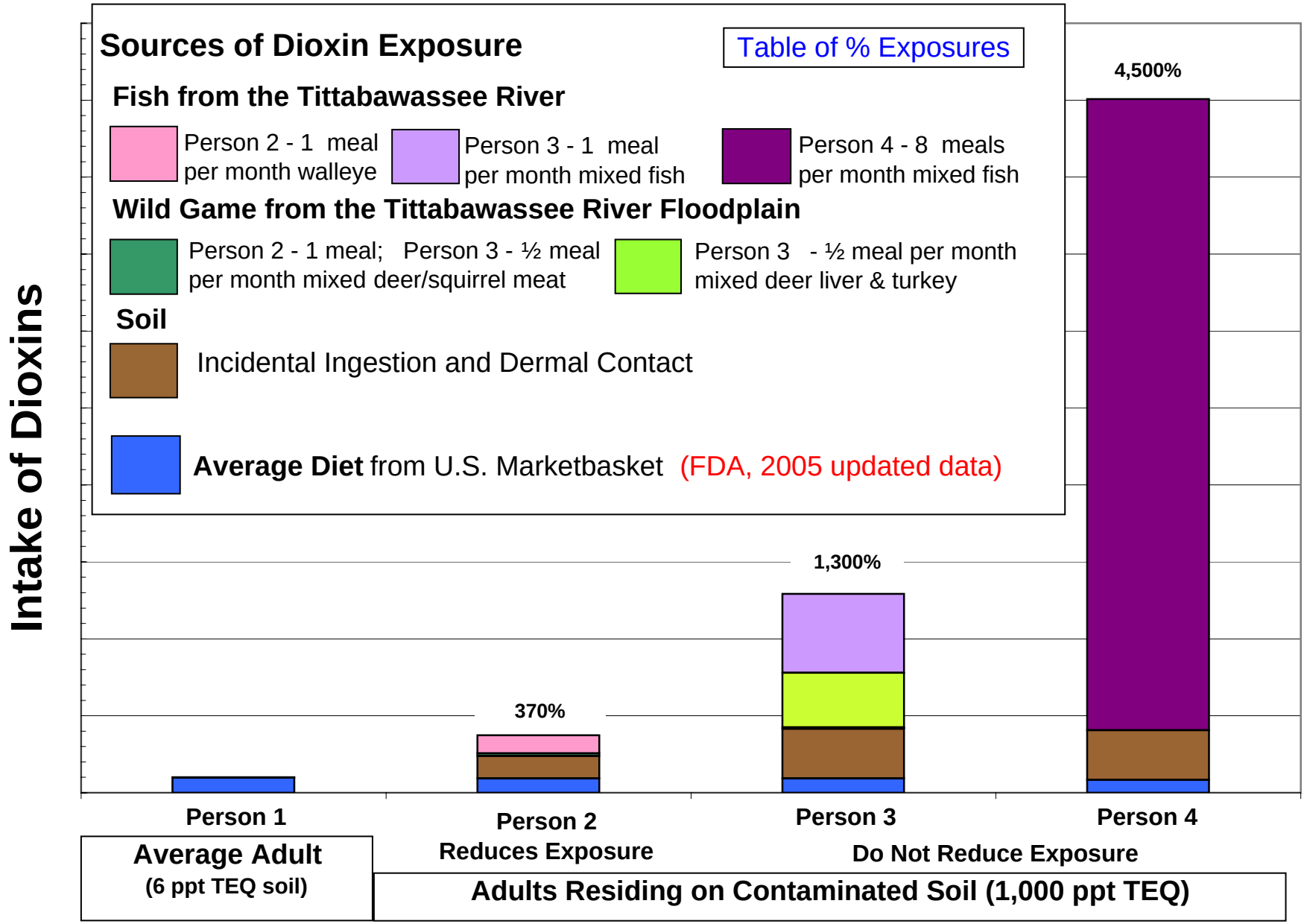
Person 2 is an adult who resides on contaminated soil and **reduces exposure** to dioxins from soil, local fish, wild game, and domestic livestock by following the recommendations in this brochure. As you can see, the bar is higher which means there is greater exposure, mostly from eating fish and from exposure to contaminated soil.

Person 3 is an adult who resides on contaminated soil and **does not reduce exposure** to dioxins from soil, local fish, and wild game by following the advisories and recommendations in this brochure. This person's monthly meals include a mixture of Tittabawassee River fish and a mixture of wild game, including deer liver and wild turkey from the Tittabawassee River floodplain. Because the advisories are not followed, this person's exposure is significantly increased.

Person 4 is an adult who resides on contaminated soil and **does not reduce exposure** to dioxins from soil and local fish by following the advisories and recommendations in this brochure. Instead of one meal of fish per month, Person 4 eats eight meals of fish per month and no local wild game. Large increases in exposure could also occur from eating other animal products raised on the floodplain, such as chicken meat or eggs raised on contaminated soil, or by eating more highly contaminated fish (e.g., catfish) from the river.

Copies of these advisories, recommendations, and details on the graph are available at www.michigan.gov/deqdioxin.

Examples of Adult Dioxin Exposure (FDA, 2005 update)



% Dioxin Exposures Relative to Typical Michigan Resident's Total Exposure

Dioxin Intake as % of Person 1 Total Intake	Person 1	Person 2	Person 3	Person 4
U.S. Marketbasket (FDA, 2005 update)	98.06	92.96	92.96	83.28
Soil exposure	1.94	145.51	322.63	322.63
Tittabawassee River Floodplain Wild Game (deer and squirrel meat)	0.00	17.15	8.58	0.00
Tittabawassee River Floodplain Wild Game (deer liver and turkey)	0.00	0.00	354.90	0.00
Tittabawassee River Fish	0.00	118.30	512.63	4101.06
Total (pg/kg per day)	0.275	1.030	3.556	12.409
Total % compared to Person 1 Total	100	374	1292	4507
Multiples over Average	1	3.7	13	45

Total pg/kg-day from Table of Daily Intakes

Description of each Person

Daily Adult Dioxin Exposure Examples

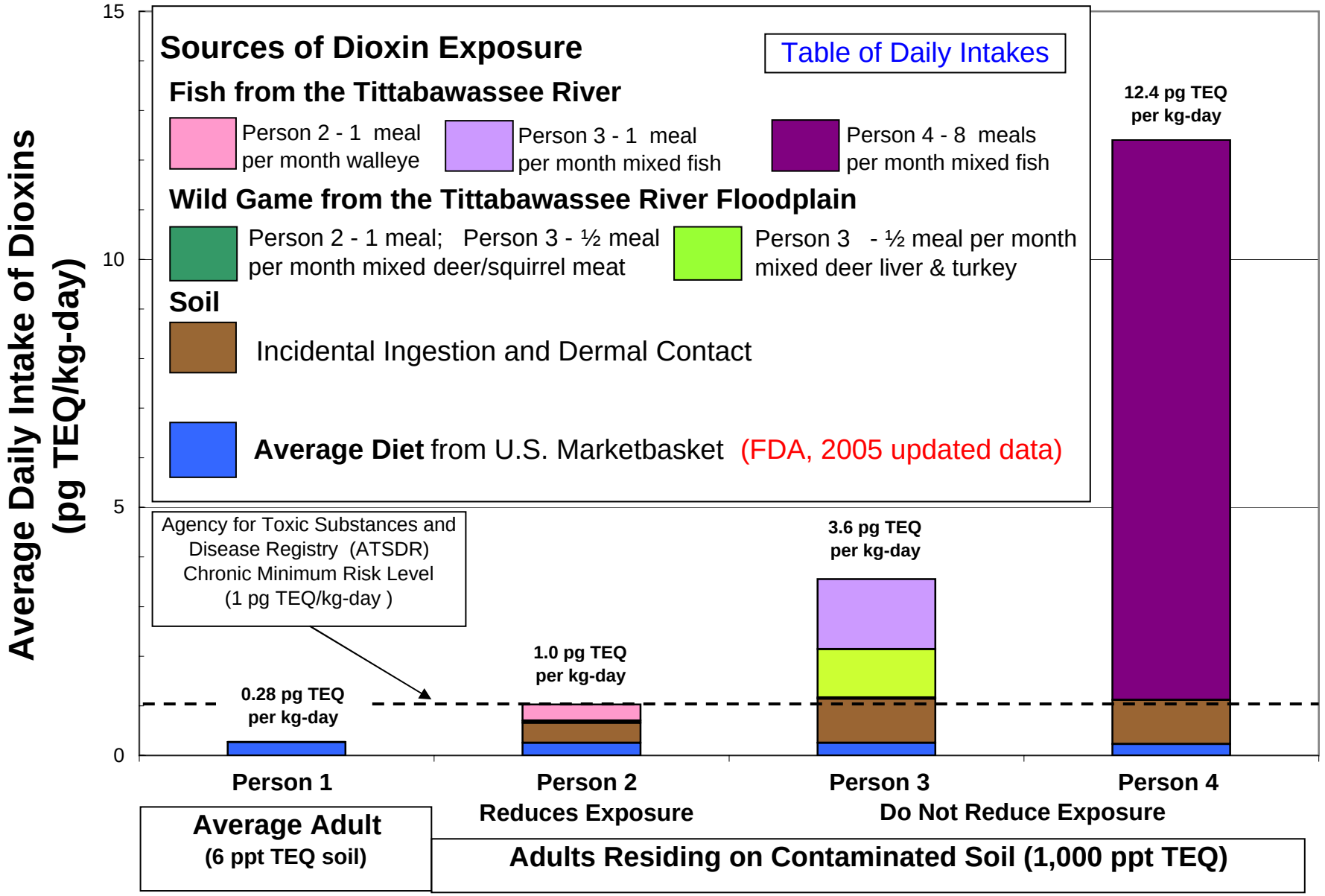


Table of Daily Intakes

Daily Dioxin Intake (pg/kg-day)	Person 1	Person 2	Person 3	Person 4
U.S. Marketbasket (FDA, 2005 update)	0.270	0.26	0.26	0.23
Soil exposure	0.005	0.40	0.89	0.89
Tittabawassee River Floodplain Wild Game (deer and squirrel meat)	0.000	0.05	0.02	0.00
Tittabawassee River Floodplain Wild Game (deer liver and turkey)	0.000	0.00	0.98	0.00
Tittabawassee River Fish	0.000	0.33	1.41	11.29
Total (pg/kg-day)	0.275	1.03	3.56	12.41
	See Person 1 Table for details.	See Person 2 Table for details.	See Person 3 Table for details.	See Person 4 Table for details.

Description of each Person

Monthly Adult Dioxin Exposure Examples

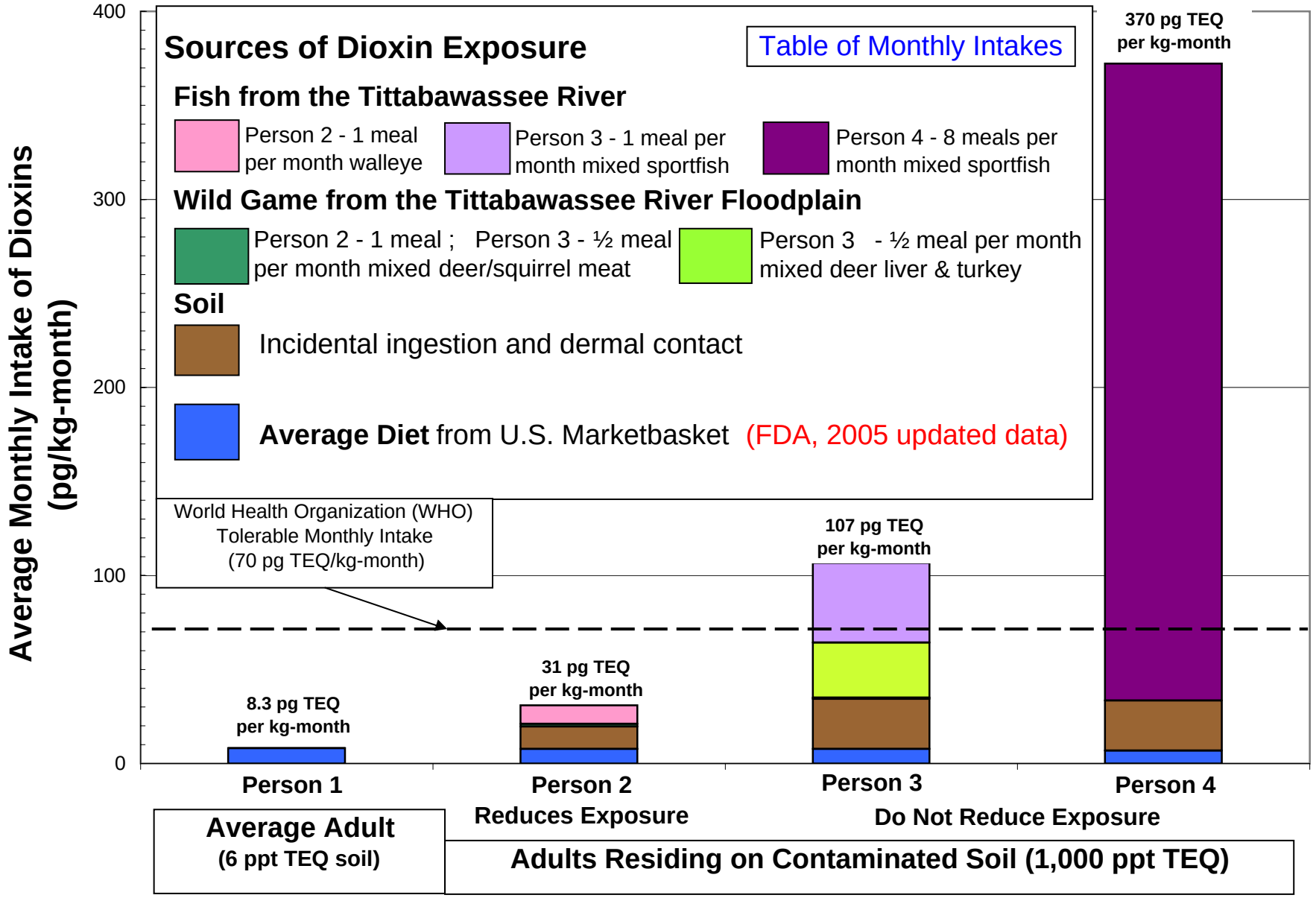


Table of Monthly Intakes

Average Monthly Dioxin Intake (pg/kg-month)	**Person 1**	**Person 2**	**Person 3**	**Person 4**
U.S. Marketbasket (FDA, 2005 update)	8.10	7.7	7.7	6.9
Soil exposure	0.16	12.0	26.6	26.6
Tittabawassee River Floodplain Wild Game (deer and squirrel meat)	0.00	1.4	0.7	0.0
Tittabawassee River Floodplain Wild Game (deer liver and turkey)	0.00	0.0	29.3	0.0
Tittabawassee River Fish	0.00	9.8	42.3	338.7
Total (pg/kg month)	8.26	30.9	106.7	372.3

Values from Table of Daily Intakes x 30 days/month

Description of each Person

Person 1 Table

Media	Conc. TEQ - WHO		Average Adult Contact Rate		Daily Intake (pg/Kg day)	% of Total	Sources of TEQ and Intake/Contact Rates
Local Sources							
Soil ingestion	6	ppt	100	mg/day	0.004	1.6	See Local Sources Table
Soil dermal contact	6	ppt	406	mg/day	0.0010	0.379	See Local Sources Table
U.S. Market Basket Sources							
Freshwater fish/shellfish ingestion (48% of FDA Fish)					0.010	3.5	See FDA 2005 Table; EPA 2002 for split
Marine fish and shellfish ingestion (52% of FDA Fish)					0.010	3.8	See FDA 2005 Table; EPA 2002 for split
Dairy foods and mixtures					0.030	10.9	See FDA 2005 Table
Eggs and mixtures					0.007	2.4	See FDA 2005 Table
Fats, oils and mixtures					0.003	1.2	See FDA 2005 Table
Fruits, vegetables and mixtures					0.007	2.4	See FDA 2005 Table
Meat and mixtures					0.133	48.4	See FDA 2005 Table
Poultry and mixtures					0.007	2.4	See FDA 2005 Table
Other foods and mixtures					0.063	23.0	See FDA 2005 Table
FDA Fish and mixtures					0.020		See FDA 2005 Table

U.S. Marketbasket	0.270	98.1
Soil	0.005	1.9
Total Daily (pg/kg-day) =	0.275	100
Total Monthly (pg/kg-month) =	8.4	

Fish and Mixtures separated based on freshwater and marine split from EPA, 2002 for daily Marketbasket fish intakes.

Description of each Person

Person 2 Table

Media	Conc. TEQ - WHO		Average Adult Contact Rate		Daily Intake (pg/Kg day)	% of Total	Sources of TEQ and Intake/Contact Rates
Local Sources from Tittabawassee River and Floodplain							
Soil ingestion	1000	ppt	50	mg/day	0.357	34.7	See Local Sources Table
Soil dermal contact	1000	ppt	203	mg/day	0.044	4.2	See Local Sources Table
Walleye	3	ppt	7.6	g/day	0.326	31.6	See Local Sources Table
Wild Game (deer and squirrel meat)	0.435	ppt	7.6	g/day	0.047	4.6	See Local Sources Table
Wild Game (deer liver and turkey)						0.0	See Local Sources Table
U.S. Marketbasket Sources							
Freshwater fish/shellfish ingestion (48% of FDA Fish, adjusted)					0.000	0.0	See FDA 2005 Table; EPA 2002 for split
Marine fish and shellfish ingestion (52% of FDA Fish)					0.010	1.0	See FDA 2005 Table; EPA 2002 for split
Dairy foods and mixtures					0.030	2.9	See FDA 2005 Table
Eggs and mixtures					0.007	0.6	See FDA 2005 Table
Fats, oils and mixtures					0.003	0.3	See FDA 2005 Table
Fruits, vegetables and mixtures					0.007	0.6	See FDA 2005 Table
Meat and mixtures (adjusted)					0.129	12.5	See FDA 2005 Table
Poultry and mixtures					0.007	0.6	See FDA 2005 Table
Other foods and mixtures					0.063	6.2	See FDA 2005 Table
FDA Fish and mixtures					0.020		See FDA 2005 Table

U.S. Marketbasket	0.256	24.9
TRF Soil	0.401	38.9
TRF Game	0.047	4.6
TR Fish	0.326	31.6
Total Daily (pg/kg-day) =	1.0	100
Total Monthly(pg/kg-month) =	31	

Fish and Mixtures separated based on freshwater and marine split from EPA, 2002 for daily Marketbasket fish intakes.
U.S. Marketbasket - Freshwater fish daily intake adjusted to account for 1 meal per month substituted with local fish.
U.S. Marketbasket - Meat and mixtures daily intake adjusted to account for 1 meal per month substituted with local wild game.

Description of each Person

Person 3 Table

Media	Conc. TEQ - WHO		Average Adult Contact Rate		Daily Intake (pg/Kg day)	% of Total	Sources of TEQ and Intake/Contact Rates
Local Sources from Tittabawassee River and Floodplain							
Soil ingestion	1000	ppt	100	mg/day	0.714	20.1	See Local Sources Table
Soil dermal contact	1000	ppt	406	mg/day	0.174	4.9	See Local Sources Table
Mixed Fish	13	ppt	7.6	g/day	1.411	39.7	See Local Sources Table
Wild Game (deer and squirrel meat)	0.435	ppt	3.8	g/day	0.024	0.7	See Local Sources Table
Wild Game (deer liver and turkey)	18	ppt	3.8	g/day	0.977	27.5	See Local Sources Table
U.S. Marketbasket Sources							
Freshwater fish/shellfish ingestion (48% of FDA Fish, adjusted)					0.000	0.0	See FDA 2005 Table; EPA 2002 for split
Marine fish and shellfish ingestion (52% of FDA Fish)					0.010	0.3	See FDA 2005 Table; EPA 2002 for split
Dairy foods and mixtures					0.030	0.8	See FDA 2005 Table
Eggs and mixtures					0.007	0.2	See FDA 2005 Table
Fats, oils and mixtures					0.003	0.1	See FDA 2005 Table
Fruits, vegetables and mixtures					0.007	0.2	See FDA 2005 Table
Meat and mixtures (adjusted)					0.129	3.6	See FDA 2005 Table
Poultry and mixtures					0.007	0.2	See FDA 2005 Table
Other foods and mixtures					0.063	1.8	See FDA 2005 Table
FDA Fish and mixtures					0.020		See FDA 2005 Table

U.S. Marketbasket	0.256	7.2
TRF Soil	0.888	25.0
TRF Game	1.001	28.1
TR Fish	1.411	39.7
Total Daily (pg/kg-day) =	3.56	100
Total Monthly(pg/kg-month) =	108	

Fish and Mixtures separated based on freshwater and marine split from EPA, 2002 for daily Marketbasket fish intakes.
U.S. Marketbasket - Freshwater fish daily intake adjusted to account for 1 meal per month substituted with local fish.
U.S. Marketbasket - Meat and mixtures daily intake adjusted to account for 1 meal per month substituted with local wild game.

Description of each Person

Person 4 Table

Media	Conc. TEQ - WHO		Average Adult Contact Rate		Daily Intake (pg/Kg day)	% of Total	Sources of TEQ and Intake/Contact Rates
Local Sources from Tittabawassee River and Floodplain							
Soil ingestion	1000	ppt	100	mg/day	0.714	5.8	See Local Sources Table
Soil dermal contact	1000	ppt	406	mg/day	0.174	1.4	See Local Sources Table
Mixed Fish	13	ppt	60.8	g/day	11.291	91.0	See Local Sources Table
Wild Game (deer and squirrel meat)						0.0	See Local Sources Table
Wild Game (deer liver and turkey)						0.0	See Local Sources Table
U.S. Marketbasket Sources							
Freshwater fish/shellfish ingestion (48% of FDA Fish)					0.000	0.0	See FDA 2005 Table; EPA 2002 for split
Marine fish and shellfish ingestion (52% of FDA Fish)					0.010	0.1	See FDA 2005 Table; EPA 2002 for split
Dairy foods and mixtures					0.030	0.2	See FDA 2005 Table
Eggs and mixtures					0.007	0.1	See FDA 2005 Table
Fats, oils and mixtures					0.003	0.0	See FDA 2005 Table
Fruits, vegetables and mixtures					0.007	0.1	See FDA 2005 Table
Meat and mixtures					0.102	0.8	See FDA 2005 Table
Poultry and mixtures					0.007	0.1	See FDA 2005 Table
Other foods and mixtures					0.063	0.5	See FDA 2005 Table
FDA Fish and mixtures					0.020		See FDA 2005 Table

U.S. Marketbasket	0.229	1.8
TRF Soil	0.888	7.2
TRF Game	0.000	0.0
TR Fish	11.291	91.0
Total Daily (pg/kg-day) =	12.4	100
Total Monthly(pg/kg-month) =	378	

Fish and Mixtures separated based on freshwater and marine split from EPA, 2002 for daily Marketbasket fish intakes.
U.S. Marketbasket - Freshwater fish daily intake adjusted to account for 1 meal per month substituted with local fish.
U.S. Marketbasket - Meat and mixtures daily intake adjusted to account for 7 meals per month substituted with local fish.

Description of each Person

Local Sources Table

Input values for intake rate calculations by Person used for Local Sources

Local Sources Table				
Input for intake rate calculation	**Person 1**	**Person 2**	**Person 3**	**Person 4**
Body weight (kg)	70	70	70	70
Soil TEQ (ppt)	6 [a]	1000 [b]	1000 [b]	1000 [b]
Soil Ingestion Rate (mg/day)	100 [c]	50 [d]	100 [c]	100 [c]
Fraction Absorbed from **Soil** Ingestion [e]	0.5	0.5	0.5	0.5
Soil Dermal Contact Rate (mg/day)	406 [f]	203 [g]	406 [f]	406 [f]
Fraction Absorbed from **Soil** Dermal Contact [h]	0.03	0.03	0.03	0.03
TR **Fish** TEQ (ppt)	0 [j]	3 [k]	13 [l]	13 [l]
TR **Fish** Ingestion Rate (g/day)	0 [j]	7.6 [m]	7.6 [m]	60.8 [n]
TRF **Wild Game** TEQ (deer and squirrel meat) (ppt)	0 [o]	0.435 [p]	0.435 [p]	0 [o]
TRF **Wild Game** TEQ (deer liver and turkey) (ppt)	0 [o]	0 [q]	18 [r]	0 [o]
TRF **Wild Game** Ingestion Rate (deer and squirrel meat) (g/day)	0 [o]	7.6 [s]	3.8 [t]	0 [o]
TRF **Wild Game** Ingestion Rate (deer liver and turkey) (g/day)	0 [o]	0 [q]	3.8 [t]	0 [o]

[a] Person 1 soil concentration is based on average Michigan soil TEQ concentration, MDEQ, 1999.

[b] Persons 2-4 soil concentration is based ATSDR interim policy guideline soil action level used to determine interim response activities.

[c] Persons 1,3,4 soil ingestion rate is based on Rule 720 MDEQ, 2002.

[d] Person 2 soil ingestion rate is based on half Rule 720 MDEQ, 2002 to represent reduced exposure.

[e] Fraction absorbed from soil is based on ingestion absorption efficiency, Rule 752 Table, MDEQ, 2002.

[f] Persons 1,3,4 soil dermal contact rate is based on Rule 720 MDEQ, 2002.

[g] Person 2 soil dermal contact rate is based on half Rule 720 MDEQ, 2002 to represent reduced exposure.

[h] Fraction absorbed from soil is based on dermal absorption efficiency, Rule 752 Table, MDEQ, 2002.

[j] Person 1 does not eat local fish.

Local Sources Table

[k] Person 2 fish (walleye) concentration is based on average Tittabawassee River walleye TEQ concentration from years 1992-2003 data, ATSDR, 2005.

[l] Persons 3-4 fish concentration is based on average fish concentrations for a mixture of Tittabawassee River fish. The mixture is based on percent of total fish consumption for each fish category as provided in Fish Table below. Data for fish concentrations from 1992-2003 and percent consumption by fish category are from ATSDR, 2005.

Local Fish Table.

Tittabawassee River Fish Category	Species in Category	Percent of fish category in Mixed Fish	Average Fillet concentration for category (pg/g fish)
Walleye	Walleye	39%	3
Other Sport Fish	Smallmouth Bass, White Bass, Northern Pike, Pan fish	35%	11
Bottom Feeders	Carp, Catfish, Suckers, Bullheads	26%	30
Mixed Fish	all of above		**13**

[m] Average daily fish ingestion rate for 1 meal per month is based on an 228 g (8-ounce) meal/ 30 days.

[n] Average daily fish ingestion rate for 8 meals per month is based on 8 x 228 g (8-ounce) meals or 1,824 g / 30 days.

[o] Persons 1 and 4 do not eat local wild game.

[p] Person 2 wild game (deer and squirrel meat) concentration is based on average TEQ concentration for a mixture of deer and squirrel meat taken from the Tittabawassee River Floodplain, downstream of Midland. The mixture average TEQ concentration assumes 10 meals per year of deer meat and 2 meals per year of squirrel meat or 1 meal per month of the deer and squirrel meat mixture. The data for the TEQ concentrations are from Entrix, 2004. See the Wild Game Table below for details.

[q] Person 3 wild game (deer and squirrel meat) concentration is based on average TEQ concentration for a mixture of deer and squirrel meat taken from the Tittabawassee River Floodplain, downstream of Midland. The mixture average TEQ concentration assumes 5 meals per year of deer meat and 1 meals per year of squirrel meat or ½ meal per month of the deer and squirrel meat mixture. The data for the TEQ concentrations are from Entrix, 2004. See the Wild Games Table below for details.

[r] Person 3 wild game (deer liver and turkey) concentration is based on average TEQ concentration for a mixture of deer liver and turkey taken from the Tittabawassee River Floodplain, downstream of Midland. The mixture average TEQ concentration assumes 2 meals per year of turkey with skin, 2 meals per year of turkey without skin and 2 meals per year of deer liver or ½ meal per month of the deer liver and turkey mixture. The data for the TEQ concentrations are from Entrix, 2004. See the Wild Games Table below for details.

Local Sources Table

Wild Game Table.			
Wild Game Category	**Average Concentration (ppt TEQ-WHO)**	**Person 2 Wild Game consumption**	**Person 3 Wild Game consumption**
Downstream deer muscle	0.35	10 meals per year	5 meals per year
Downstream squirrel muscle	0.86	2 meals per year	1 meal per year
deer and squirrel meat mixture	[p]**0.435**	[p](12 total mixed deer and squirrel meat meals per year = 1 meal per month)	[s](6 total mixed deer and squirrel meat meals per year = ½ meal per month)
downstream turkey with skin	10.2	None	2 meals/year
downstream turkey without skin	6.5	None	2 meals/year
downstream deer liver	37.5	None	2 meals/year
deer liver and turkey mixture	[q]**18.1**	None	[t](6 total mixed deer liver and turkey meals per year = ½ meal per month)

[s] Person 2 average daily wild game (deer and squirrel meat) ingestion rate is based on 12 meals (228 g or 8 oz. each) per year (1 meal per month).

[t] Person 3 average daily wild game ingestion rate is based on 6 meals (228 g or 8 oz. each) per year (½ meal per month) for each mixture category (deer and squirrel meat; deer liver and turkey).

U.S. Market Basket Food Intakes from FDA, 2004 updated November 2004 and July 2005

Dietary PCDD/PCDF Exposure Estimates (pg WHO-TEQ/kg body weight/month) by Food Category
Found at: http://www.cfsan.fda.gov/~lrd/dioxee.html

Food Category	Men 25-30 yrs (pg TEQ/kg/month) (ND=0)	Men 25-30 yrs (pg TEQ/kg/day) (ND=0)	Men 25-30 yrs (pg TEQ/kg/month) (ND=1/2 LOD)	Men 25-30 yrs (pg TEQ/kg/day) (ND=1/2 LOD)	Men 25-30 yrs (pg TEQ/kg/month) (ND=LOD)	Men 25-30 yrs (pg TEQ/kg/day) (ND=LOD)
Dairy Foods and mixtures	0.9	**0.030**	1.4	0.047	1.9	0.063
Eggs and mixtures	0.2	**0.007**	0.3	0.010	0.4	0.013
Fats, oils and mixtures	0.1	**0.003**	0.2	0.007	0.2	0.007
Fish and mixtures	0.6	**0.020**	0.7	0.023	0.8	0.027
Fruits, vegetables and mixtures	0.2	**0.007**	1.1	0.037	2	0.067
Meat and mixtures	4	**0.133**	4.8	0.160	5.7	0.190
Poultry and mixtures	0.2	**0.007**	0.5	0.017	0.7	0.023
Other foods and mixtures	1.9	**0.063**	7	0.233	12.2	0.407
Total	8.1	**0.270**	16	0.533	23.9	0.797
sum	8.1	0.270	16	0.533	23.9	0.797

Adult male (25-30 year old) used for exposure examples.
ND=0, in cases where dioxins and furans were not detected (ND) at the limit of detection, the concentration value was set assuming that the concentration of a not detected value was zero (ND = 0). ND=0 values are used for U.S. Marketbasket intake values to be consistent with fish TEQ values available for exposure comparisons.
Fish and mixtures separated based on freshwater and marine split from EPA, 2002 for each Person intake rate.

U.S. Market Basket Food Intakes from FDA, 2004 (used in Figure 1 from Reducing Exposures at Home)

Dietary PCDD/PCDF Exposure Estimates (pg WHO-TEQ/kg body weight/month) by Food Category

Food Category	Men 25-30 yrs (pg TEQ/kg/month) (ND=0)	Men 25-30 yrs (pg TEQ/kg/day) (ND=0)	Men 25-30 yrs (pg TEQ/kg/month) (ND=1/2 LOD)	Men 25-30 yrs (pg TEQ/kg/day) (ND=1/2 LOD)	Men 25-30 yrs (pg TEQ/kg/month) (ND=LOD)	Men 25-30 yrs (pg TEQ/kg/day) (ND=LOD)
Dairy Foods and mixtures	1.1	**0.037**	1.6	0.053	2.2	0.073
Eggs and mixtures	0.3	**0.010**	0.4	0.013	0.5	0.017
Fats, oils and mixtures	0.1	**0.003**	0.2	0.007	0.2	0.007
Fish and mixtures	0.5	**0.017**	0.6	0.020	0.7	0.023
Fruits, vegetables and mixtures	0.8	**0.027**	2.1	0.070	3.5	0.117
Meat and mixtures	5	**0.167**	5.9	0.197	6.8	0.227
Poultry and mixtures	0.5	**0.017**	0.8	0.027	1.1	0.037
Other foods and mixtures	1.5	**0.050**	7.1	0.237	12.6	0.420
Total	9.9	**0.330**	18.7	0.623	27.5	0.917
sum	9.8	0.327	18.7	0.623	27.6	0.920

Adult male (25-30 year old) used for exposure examples.
ND=0, in cases where dioxins and furans were not detected (ND) at the limit of detection, the concentration value was set assuming that the concentration of a not detected value was zero (ND = 0). ND=0 values are used for U.S. Marketbasket intake values to be consistent with fish TEQ values available for exposure comparisons.
Fish and mixtures separated based on freshwater and marine split from EPA, 2002 for each Person intake rate.

References

ATSDR (Agency for Toxic Substances and Disease Registry), 1997. Dioxin and Dioxin-Like Compounds in Soil, Part 1: ATSDR Interim Policy Guideline. Atlanta: U.S. Department of Health and Human Services. http://www.atsdr.cdc.gov/dioxindt.html

ATSDR (Agency for Toxic Substances and Disease Registry), 1998. Toxicological profile for chlorinated dibenzo-*p*-dioxins. Atlanta: U.S. Department of Health and Human Services. http://www.atsdr.cdc.gov/toxprofiles/tp104.html#bookmark14

ATSDR (Agency for Toxic Substances and Disease Registry), 2005. Petitioned Health Consultation: Dioxins in Wild Game Taken from the Tittabawassee River Floodplain South of Midland, Midland and Saginaw Counties, Michigan EPA ID# MID980994354. Atlanta: U.S. Department of Health and Human Services. http://www.michigan.gov/documents/Wild_Game_PHC_FINAL_123884_7.pdf.

ATSDR (Agency for Toxic Substances and Disease Registry), 2005. Tittabawassee River Fish Consumption Health Consultation. Atlanta: U.S. Department of Health and Human Services. http://www.michigan.gov/documents/TittabawasseeRiverHC072705_135404_7.pdf

Entrix, 2004. Evaluation of PCDDs and PCDFs in wild game taken from the flood plain along the Tittabawassee River. Prepared for the Dow Chemical Company. Entrix, Inc. East Lansing, Michigan. June.

EPA (U.S. Environmental Protection Agency), 2002. Estimated per capita fish consumption in the United States. EPA-821-C-02-003. U.S. Environmental Protection Agency. Washington, DC. http://www.epa.gov/waterscience/fish/consumption_report.pdf

FDA (U.S. Food and Drug Administration), 2005. PCDD/PCDF exposure estimates. July 2004; Update November 2004 and June 2005. http://www.cfsan.fda.gov/~lrd/dioxee.html.

MDCH (Michigan Department of Community Health), 2004. Michigan Family Fish Consumption Guide. MCH, Lansing, MI. http://www.michigan.gov/mdch/0,1607,7-132-2945_5105-13110--,00.html.

MDCH (Michigan Department of Community Health), 2004. State of Michigan Issues Health Advisories for Consuming Wild Game from the Tittabawassee River Flood Plain. Lansing, MI. September 14, 2004. http://www.michigan.gov/mdch/0,1607,7-132-8347-100553--M_2004_9,00.html

MDEQ, 1999. Michigan Background Dioxin Sample Locations and Results as of November 1999. Lansing, MI. http://www.deq.state.mi.us/documents/deq-whm-hwp-misoilbkgddioxindata.pdf

MDEQ, 2002. Part 7, Cleanup Criteria Requirements for Remedial Actions and Interim Response Activity Designed to Meet Criteria, administrative rules promulgated under Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Lansing, MI. Revised, December, 2002. http://www.michigan.gov/deq/0,1607,7-135-3311-58095--,00.html.

World Health Organization. 2001. Joint FAO/WHO expert committee on food additives (JECFA). Fifty-seventh meeting, Rome, June 5-14, 2001. http://www.who.int/ipcs/food/jecfa/summaries/en/summary_57.pdf.